

AMENDMENTS TO THE CLAIMS

Claims 1-14 (Cancelled).

15. (Original) A method for controlling a wiper device, driving a wiper arm by means of a motor to reciprocate between an upper reversal position and a lower reversal position for a wiping operation and controlling the operation of the wiper device by detecting the wiper arm position by means of the count value of the pulse signal output as a result of the rotary motion of the motor, wherein

a reference position for resetting the count value of the pulse signal to a reference value, arranged between the upper reversal position and the lower reversal position;

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm and causing the count value of the pulse signal to show a predetermined value, arranged below the stored position; and,

when the wiper arm stops in operation between the upper reversal position and the reference position, it is always started to move toward the reference position at the time of restarting and the count value of the pulse signal is reset to the reference value as the wiper arm passes the reference position;

when the wiper arm stops in operation between the reference position and the stored position, it is started either toward the reference position or the lower limit position at the time of restarting and the count value of the pulse signal is reset to the reference value or the predetermined value as the wiper arm passes the reference position or arrives at the lower limit position, whichever appropriate.

16. (Original) A method for controlling a wiper device, driving a wiper arm by means of a motor to reciprocate between an upper reversal position and a lower reversal position for a

wiping operation and controlling the operation of the wiper device by detecting the wiper arm position by means of the count value of the pulse signal output as a result of the rotary motion of the motor, wherein

a reference position for resetting the count value of the pulse signal to a reference value, arranged between the upper reversal position and the lower reversal position;

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm and causing the count value of the pulse signal to show a predetermined value, arranged below the stored position; and,

when the wiper arm is driven to reciprocate between the lower reversal position and the stored position, it is moved to the lower limit position for operation in each go and return cycle and the count value of the pulse signal is reset to the predetermined value in response to the arrival of the wiper arm to the lower limit position.

17. (Previously Presented) A method for controlling a wiper device, driving a wiper arm by means of a motor to reciprocate between an upper reversal position and a lower reversal position for a wiping operation and controlling the operation of the wiper device by detecting the wiper arm position by means of the count value of the pulse signal output as a result of the rotary motion of the motor, wherein

a reference position for resetting the count value of the pulse signal to a reference value, arranged between the upper reversal position and the lower reversal position,

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm and causing the count value of the pulse signal to show a predetermined value, arranged below the stored position; and,

when the wiper arm is driven to reciprocate between the lower reversal position and the stored position and if the count value of the pulse signal shows a value indicating as if the wiper arm were positioned at the side of the reference position beyond the lower reversal position, the wiper arm is moved to the lower limit position and the count value of the pulse signal is reset to the predetermined value in response to the arrival of the wiper arm to the lower limit position.

Claims 18-28 (Cancelled).

29. (New) A wiper device to be driven by an electric motor including a motor main body having a rotary shaft, and a speed reduction mechanism for reducing a number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, said wiper device comprising:

a wiper arm to be connected to the output shaft and operable to reciprocate between an upper reversal position and a lower reversal position during a wiping operation;

a first magnetism detection element to be located opposite a predetermined position of the output shaft when said wiper arm is at a reference position;

a second magnetism detection element to be located at a position spaced from said first magnetism detection element by a predetermined angle;

a sensor magnet to be located at the output shaft, said sensor magnet having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, said first magnetism detection element and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is at a side of said upper reversal position relative to said reference position, at least one of said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when said wiper arm is at a side of said lower reversal position relative to said reference position, said first magnetism detection element being located opposite a boundary between said first magnetic pole and said second magnetic pole when said wiper arm is located at said reference position; and

a sensor for detecting a rotary angle of the rotary shaft, said sensor being operable to start detecting the rotary angle of the rotary shaft at a time when said wiper arm is at said reference position.

30. (New) A wiper device to be driven by an electric motor including a motor main body having a rotary shaft, and a speed reduction mechanism for reducing a number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, said wiper device comprising:

a wiper arm to be connected to the output shaft and operable to reciprocate between an upper reversal position and a lower reversal position during a wiping operation;

a first magnetism detection element to be located opposite a predetermined position of the output shaft when said wiper arm is at a reference position;

a second magnetism detection element to be located at a position spaced from said first magnetism detection element by a predetermined angle;

a sensor magnet to be located at the output shaft, said sensor magnet having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, said first magnetism detection element and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is at a side of said upper reversal position relative to said reference position, at least one of said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when said wiper arm is at a side of said lower reversal position relative to said reference position, both said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when said wiper arm is at said lower reversal position; and

a sensor for detecting a rotary angle of the rotary shaft, said sensor being operable to start detecting the rotary angle of the rotary shaft at a time when said wiper arm is at said reference position.

31. (New) A wiper device to be driven by an electric motor including a motor main body having a rotary shaft, and a speed reduction mechanism for reducing a number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, said wiper device comprising:

a wiper arm to be connected to the output shaft and operable to reciprocate between an upper reversal position and a lower reversal position during a wiping operation;

a first magnetism detection element to be located opposite a predetermined position of the output shaft when said wiper arm is at a reference position;

a second magnetism detection element to be located at a position spaced from said first magnetism detection element by a predetermined angle;

a sensor magnet to be located at the output shaft, said sensor magnet having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, said first magnetism detection element and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is at a side of said upper reversal position relative to said reference position, at least one of said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when said wiper arm is at a side of said lower reversal position relative to said reference position, a wiper arm stored position being located below said lower reversal position, said first magnetism detection element being located opposite said first magnetic pole and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is at said stored position; and

a sensor for detecting a rotary angle of the rotary shaft, said sensor being operable to start detecting the rotary angle of the rotary shaft at a time when said wiper arm is at said reference position.

32. (New) The wiper device of claim 31, wherein, when said wiper arm stops at a position other than said stored position, said wiper arm is always started to move toward said reference position at a restarting time.

33. (New) A wiper device to be driven by an electric motor including a motor main body having a rotary shaft, and a speed reduction mechanism for reducing a number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, said wiper device comprising:

a wiper arm to be connected to the output shaft and operable to reciprocate between an upper reversal position and a lower reversal position during a wiping operation;

a first magnetism detection element to be located opposite a predetermined position of the output shaft when said wiper arm is at a reference position;

a second magnetism detection element to be located at a position spaced from said first magnetism detection element by a predetermined angle;

a sensor magnet to be located at the output shaft, said sensor magnet having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, said first magnetism detection element and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is at a side of said upper reversal position relative to said reference position, at least one of said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when said wiper arm is at a side of said lower reversal position relative to said reference position, when said wiper arm stops between said upper reversal position and said lower reversal position in operation, said wiper arm is always started to move toward said reference position at a restarting time; and

a sensor for detecting a rotary angle of the rotary shaft, said sensor being operable to start detecting the rotary angle of the rotary shaft at a time when said wiper arm is at said reference position.

34. (New) A method of controlling a wiper arm using a wiper device, the wiper device being driven by an electric motor including a motor main body having a rotary shaft, and a speed reduction mechanism for reducing a number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, said method comprising:

detecting a position of the wiper arm on the basis of a state in which the wiper arm is positioned at a reference position; and

driving the wiper arm to reciprocate between an upper reversal position and a lower reversal position for performing a wiping operation;

wherein the wiper device includes a sensor magnet at the output shaft of the electric motor, the sensor magnet having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, and the wiper device further includes two magnetism detection elements for each detecting a polarity of the sensor magnet and generating respective signals based on the detected polarity; and

wherein, when the wiper arm stops between the upper reversal position and the lower reversal position during operation, the wiper arm is always started to move toward the reference position at a restarting time based on a combination of the signals generated by the two magnetism detection elements.

35. (New) The method of claim 34, wherein a wiper arm stored position is located below the lower reversal position in the wiper device, and when the wiper arm stops at a position other than the stored position during operation, the wiper arm is always started to move toward the reference position at the restarting time.

36. (New) A wiper device to be driven by an electric motor including a speed reduction mechanism, a motor main body having a rotary shaft, and a speed reduction mechanism for reducing a number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, said wiper device comprising:

a wiper arm to be connected to the output shaft and operable to reciprocate between an upper reversal position and a lower reversal position during a wiping operation;

a first magnetism detection element to be located opposite a predetermined position of the output shaft when said wiper arm is at a reference position;

a second magnetism detection element to be located at a position spaced from said first magnetism detection element by a predetermined angle; and

a sensor magnet to be located at the output shaft, said sensor magnet having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, said first magnetism detection element and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is at a side of said upper reversal position relative to said reference position, at least one of said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when said wiper arm is at a side of said lower reversal position relative to said reference position, each of said first magnetism detection element and said second magnetism detection element being operable to detect a polarity of said sensor magnet and generate a signal based on the detected polarity;

wherein said wiper arm is operable to be moved toward said reference position based on a combination of the signals generated by said first magnetism detection element and said second magnetism detection element.

37. (New) The wiper device of claim 36, wherein said first magnetism detection element is located opposite a boundary between said first magnetic pole and said second magnetic pole when said wiper arm is located at said reference position.

38. (New) The wiper device of claim 36, wherein said first magnetism detection element and said second magnetism detection element are located opposite said first magnetic pole when said wiper arm is located at said lower reversal position.

39. (New) The wiper device of claim 36, wherein a wiper arm stored position is located below said lower reversal position, said first magnetism detection element being located opposite said first magnetic pole and said second magnetism detection element being located opposite said second magnetic pole when said wiper arm is located at said stored position.

40. (New) The wiper device of claim 39, wherein, when said wiper arm stops at a position other than said stored position, said wiper device is operable to always start said wiper arm to move toward said reference position at a restarting time.

41. (New) The wiper device of claim 36, wherein, when said wiper arm stops between said upper reversal position and said lower reversal position during operation, said wiper device is operable to always start said wiper arm to move toward said reference position at a restarting time.

42. (New) The wiper device of claim 36, further comprising a sensor for detecting a rotary angle of the rotary shaft, said sensor being operable to start detecting the rotary angle of the rotary shaft at a time when said wiper arm is at said reference position.

43. (New) An electric motor comprising:

a motor main body including a rotary shaft;

a speed reduction mechanism for reducing a number of revolutions of said rotary shaft and transmitting the revolutions to an output shaft;

a first magnetism detection element located opposite a predetermined position of said output shaft when a wiper arm to be connected to said output shaft is at a reference position;

a second magnetism detection element arranged at a position spaced from said first magnetism detection element by a predetermined angle; and

a sensor magnet at said output shaft and having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and having different polarities, said first magnetism detection element and said second magnetism detection element being located opposite said second magnetic pole when the wiper arm is at a side relative to the reference position, at least one of said first magnetism detection element and said second magnetism detection element being located opposite said first magnetic pole when the wiper arm is at the other side relative to the reference position, each of said first magnetism detection element and

said second magnetism detection element being operable to detect a polarity of said sensor magnet and generate a signal based on the detected polarity;

wherein said electric motor is operable to move the wiper arm toward said reference position based on a combination of the signals generated by said first magnetism detection element and said second magnetism detection element.